GRAPHIC-AIDED DOCUMENT-REVIEW MANAGEMENT SYSTEM

This Application is benefited from a previously filed Provisional Patent Application 60/115,919 filed on January 14, 1999.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to document review management system. More particularly, this invention relates to a graphic-based document review management system wherein textual descriptions of each graphic element are arranged for display together with the graphic element to provide enhanced document review and examination.

2. Description of the Prior Art

The arrangement of a document with graphic illustrations shown on different pages from relevant text descriptions often causes inconvenience in reading and understanding the contents of the document. Flipping back and forth between pages in attempt to correlate the textual descriptions to various graphic elements located on different pages often requires extra times and efforts. Particular example is a patent document where the drawings, e.g., Fig. 1A, are included in first part of the patent, typically starting from second page, as drawings of various preferred embodiments. While the description of these preferred embodiments are included in the last part of the patent document as that shown in Fig. 1B. Review of a patent document requires a document reviewer to simultaneously read the texts and view the drawings in parallel. Often, it is inconvenient not only because the document is required to flip back and forth between different parts of the document, but also relevant textual sections are also dispersed at different parts of the document. Especially, in a patent document, a claimed element may be described in the Detail Description of Preferred Embodiment, and then presented in several claims. The Examiner must review the drawings and

the textual descriptions to determine if the claims have sufficient support. Such review must be carried out in greater details, particularly if the questions are related to how the elements are claimed. Even though the drawings are included in a patent document, it is often inconvenient and

5 cumbersome to make best use of the drawings due to the arrangement of separating the drawings into particular section from the textual descriptions and the claims. Referring also to Figs. 1C and 1D for drawings included in a technical paper and a technical manual. Again, a document reviewer has to search among many sections of document to

10 find relevant descriptions of particular graphical elements to gain understanding of the descriptions.

Advancements in computer search and document management do not yet benefit or help the tasks performed by a Patent Examiner of patent

15 document reviewer. The "search engines" and "document linkers" or "desktop publishing" systems can link and associate textual or graphic terms between different documents, or can insert graphic drawings into different parts of the documents. However, none of these systems is provided to arrange and present the relevant information and data related

20 to a particular graphical element for the convenience of review and understanding by relating or linking the textual descriptions or claimed terms to a corresponding graphic element.

Rivette et al. disclosed in U.S. Patent 5,991,751 and 5,991,780 a

25 system, method and computer program product for displaying a patent document and a patent image. The system and method are useful in reducing the stress in review a document by displaying the text in a side-by-side display page. However, a document reviewer is still required to look "left-and-right" to compare the textual descriptions with the

30 displayed image for understanding the content of the documents. Simultaneous and side-by-side displays are not sufficient to completely resolve the difficulties faced by a document reviewer. Specifically, the spatial distance between the displayed graphic elements and the textual descriptions including the name of each displayed element prevents a

35 direct and immediate association.

Therefore, there is still a need in the art of document management and information presentation to provide a document configuration with particular arranged presentation for conveniently reviewing and examining a document. The document configuration is arranged such

5   that the review and examination of the document is aided by the graphic elements included in the document. The automatic link generation systems and techniques, which are commonly available in the market, may be employed to link textual descriptions included in various sections of a document to a graphic element. Presentation of drawings together

10   with the textual descriptions immediately near the graphic elements and also the claim languages may then be displayed when commanded by a document reviewer. The inconvenience and difficulties in reviewing and examining a document may then be resolved.

15   <u>SUMMARY OF THE PRESENT INVENTION</u>

It is therefore an object of the present invention to provide a document management system for linking and presenting each of the graphical elements with associated textual descriptions and related

20   claimed elements in the claims in a patent application such that the aforementioned difficulties and inconveniences can be resolved.

Specifically, it is an object of the present invention to provide a novel document management and presentation system to search and link

25   textual descriptions and elements in different claims of a patent document associated with each of the alpha-numeral designations of the graphic elements. A link is first established between each of the alpha-numeral designations for each of the graphical elements to a naming-term of a first textual description associated with that alpha-numeral designation. Then

30   all related descriptions for that particular naming-term are linked and gathered in a list file for that graphic element. The list file can then be displayed along with the associated graphic element for convenience of document review.

Another object of the present invention is to provide a novel graphic-based document review system by providing user options to either review the drawings with textual descriptions or claim languages of a patent document displayed in a text box next to a related graphic

5   element. Or, a document reviewer may enter a naming-term to invoke a graphic presentation related to that naming-term and all the associated descriptions and/or claim languages for that naming-term in a text box next to the graphic element associated with that naming-term.

10   Briefly, in a preferred embodiment, the present invention includes a document management system. The document management system includes a document reading means for reading a document having textual descriptions and at least a drawing consisted of graphic elements each designated with an associated alpha-numeral designation. The

15   document reading means is further provided for converting the document to a plurality of processor-recognized elements. The document management system further includes a search and link means for searching the processor-recognized elements and linking each of the graphic elements with at least one associated segment of textual

20   description. The document management system further includes a display means for displaying the drawing with each of the graphic elements displayed together with the associated segment of textual description. In a preferred embodiment, the search and link means for searching and linking the associated segment of textual description for

25   each of the graphic element further includes a document-location-finder means for locating a column number, a page number, and a line-range number for the associated segment of textual description. The display means is further provided for displaying the column number, the page number, and the line-range number for the segment of textual description

30   for each of the graphic elements.

These and other objects and advantages of the present invention will no doubt become obvious to those of ordinary skill in the art after having read the following detailed description of the preferred

35   embodiment which is illustrated in the various drawing figures.

BRIEF DESCRIPTION OF THE DRAWINGS

5   Figs. 1A is a typical patent drawing included in the first part of the
patent document;

Fig. 1B shows a relevant descriptions for the drawing of Fig. 1A
printed on a last part of the patent document;

10   Figs. 1C to 1D are drawings included in a technical paper and a
technical manual generally separated from the sections of descriptions
related to the graphical elements;

Fig. 2 is a functional block diagram of a document management
15   system according to the present invention;

Fig. 3 is a flowchart for illustrating the processing steps for
carrying out a document management process of this invention; and

Figs. 4A to 4C show a graphic presentation with better correlation
20   between the textual descriptions and the relevant graphic element as
processed by the document management system of this invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

25   Fig. 2 is a functional block diagram for illustrating a document
management system 100 of this invention. The document review
management system includes a document reading means 110 for
receiving a document either in processor-recognizable form, i.e.,
commonly called soft-copy or electronic-copy, or a hard-copy, e.g., a
30   paper copy. The document management system 100 further includes a
document preprocessing means 115 for converting the input document on
a hard copy to a processor recognizable form. The input document after it
is converted to its processor-recognizable form also includes the graphic
element each associated with a processor-recognizable alpha-numeral
35   designation. The alpha numeral designation for each graphic element is

either a numeral designation most commonly used in the drawings of a patent document (Fig. 1A) or a textual name often used in a technical paper (Fig. 1C), or user manuals (Fig. 1D).

5   The document management system 100 further includes a search and link means 120. The search and link means 120 applies each of the alpha-numeral designations for each of the graphic elements to perform a search and link operation. A search is first performed to search for a naming-term for an alpha numeral designation. For a patent document,

10   the designation of a graphic element is usually a numeral designation. A naming-term associated with that numeral designation is first searched and identified. The document management system further includes a linking database 130. For each identified naming-terms or an alpha-numeral designation, the entire document is searched to establish an

15   associated text-file and all of these text files are stored in the linking database. The document system further includes a user interface means 140, which could be graphic user interface (GUI) to receive user command to perform different document management functions. The document management system 100 further includes a display means 150 that could

20   be a monitor of a personal computer for showing the graphic display of the document and the associate text descriptions. In a typical preferred embodiment, the document pre-processing means 115, the search and link means 120, the lining database 130, the user interface means 140 and the display means 150 are incorporated in a personal computer (PC). And, the

25   document reading means 110 is a document scanner 110 for scanning a document and generates an output to the PC for further textual and graphic processing.

           Fig. 3 is a flow chart for illustrating the processing steps carried out

30   by the document management system 100 for providing a graphic-based review version of an input document that includes several sections having textual descriptions and drawings. The document management process begins (step 200) by reading the document and converting the textual and graphic elements of the documents into processor recognizable textual

35   and graphic elements (step 205). The processor-recognizable textual and

graphic elements are then processed by the search and link means 120 to search the document by using the alpha-number designations of each of the graphical elements to identify a naming-term in the section of the textual descriptions for each graphic element (steps 210). With a specific

5   naming-term identified for each graphic element, further searches are conducted over the entire document to establish a link database 130 to provide a list. The list links every sentence in the document containing a reference of either the naming-term or the alphanumerical designation of each graphic element (step 215). For each sentence in the document for a

10   graphic element, the link database further lists the column, e.g., column 4, or page number, e.g., page 135, and also the line number, e.g., lines 20 to 25, to identify the location of that description related to the graphic element. The document management system 100 further provides to a user a graphic user interface (GUI) for a document reviewer to input

15   commands for providing various kinds of graphic-based document review presentations (step 220). In responding to the user commands, a graphic-based document review presentation is displayed on the display means of the document management system 100 (step 225).

20   Fig. 4A is an exemplary display of a graphic-based review-document as processed by the document management system of this invention. For each graphic element, a user has several options for selecting a graphic representation of each drawing included in the document. These options are describe below:

25   1) A user can select to display a drawing with each of the alpha-numeral designations displayed side-by-side with a naming-term as that shown in Fig. 4A.

2) A user can then select one or several graphic elements by double clicking on the alpha-numeral designation or the naming-term to

30   display a textual-description box next to the graphic element. The textual description box will also display the column number, page number and line number for each textual description to provide location of these relevant textural descriptions in the document. An alpha-number designation may include a drawing designation such as

35   "Fig. 4A". Upon a user's double click on "Fig. 4A" the textual

description box will display relevant textual description for "Fig. 4A".
For a patent document, the claim number and line number will also be
shown associated with the naming term associated with the alpha-
numeral designation (See Fig. 4B).

5   3) A user is also provided with an option to input a user-selected
     naming-term as input. In response to the user-selected input naming-
     term, the document management system will link to one or several
     drawings of the document associated with the user-selected naming-
     term. (See Fig. 4C) The document management system will show the

10   first drawing associated with the user-selected naming-term. The
     document management system will also show all the naming-terms
     associated with all the alpha-numeral designations of that drawing.
     The user then has the options to examine more drawings and the
     detail descriptions for each of the graphic element based on options 1)

15   or 2) above. The display means 150 of the document management
     system 160 further provides a highlight display for the graphic
     elements for each of the naming terms. The highlight display may be
     in special color, special bold profile of the graphic elements or a
     flashing display for each of the graphic elements when user point a

20   cursor to a particular naming-term in the textual description box
     shown side by side with the drawing or drawings.

A Patent Examiner is often encountered with the requirements of
linking all the claimed elements to supporting descriptions, either textual

25   or graphical, provided in the entire document. The document
     management system 100 as disclosed here can conveniently aid and
     enhance the examination of a patent document. In addition to the benefits
     of more conveniently linking the textual descriptions to the graphical
     elements in the documents, the document management will aid to the

30   quality of document examination. This is because better understanding of
     the document will be enhanced with presentations between the textual
     descriptions correlated to the graphic elements showing as graphical
     presentations. For patent examination, a Patent Examiner can easily find
     out if any term included in a claim is supported in the Specification or

Drawings by entering that term to invoke a graphic display and the column and line numbers for description of that term.

According to Figs. 2 to 4 and above descriptions, a document management system is disclosed. The document management system includes a document reading means 110 for reading a document having textual descriptions and at least a drawing consisted of graphic elements each with an associated alpha-numeral designation. The document reading means 110 is further provided for converting the document to a plurality of processor-recognized elements. The document management system further includes a search and link means 120 for searching the processor-recognized elements and linking each of the graphic elements with at least one associated segment of textual description. The document management system 100 further includes display means 150 for displaying the drawing with each of the graphic elements displayed together with the associated segment of textual description. In a preferred embodiment, the search and link means 120 for searching and linking the associated segment of textual description for each of the graphic element further includes a document-location-finder means for locating a column number, a page number, and a line-range number for the associated segment of textual description. The display means 150 is further provided for displaying the column number, the page number, and the line-range number for the segment of textual description for each of the graphic elements. In another preferred embodiment, the document management system further includes a user interface 140 provided for allowing a user-to input a naming-term. The inputted naming-term invokes the search and link means 120 for searching and linking the naming-term to an associated segment of textual description and for displaying a report of finding the associated segment of textual description. In another preferred embodiment, the document management system 100 further includes a user interface 140 provided for allowing a user to input a user-selected naming-term to invoke the search and link means for searching and linking the naming-term to an associated segment of textual description for the user-selected naming-term. And, the display means 140 is further provided for displaying a

drawing having a graphic element linked with the associated segment of textual description for the user-selected naming-term when the associated segment of textual description for the user-selected naming-terms is found.

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In summary, this invention discloses a document management system for reading a document having textual descriptions and at least a drawing consisted of graphic elements. The document management system includes a display means 140 for displaying the drawing with

10   each of the graphic elements displayed together with an associated segment of textual description as portion of the textual descriptions. In another preferred embodiment, the display means is further provided for displaying for each of the graphic elements a column number, a page number, and a line-range number along with the segment of textual

15   description located in the document. In another preferred embodiment, the document management system further includes a user interface 140 provided for allowing a user to input a naming-term. The user inputted naming-term invokes the document management system for searching and linking the naming-term to an associated segment of textual

20   description and for displaying on the display means a status report of finding the associated segment of textual description.

This invention further teaches a method of document management. The method includes the steps of a) employing a document reading means

25   for reading a document having textual descriptions and at least a drawing consisted of graphic elements each with an associated alpha-numeral designation; b) converting the document to a plurality of processor-recognized elements; c) employing a search and link means for searching the processor-recognized elements and linking each of the graphic

30   elements with at least one associated segment of textual description; and d) employing a display means for displaying the drawing with each of the graphic elements displayed together with the associated segment of textual description. In a preferred embodiment, the step c) of employing the search and link means for searching and linking the associated segment of

35   textual description for each of the graphic element further includes a step

of employing a document-location-finder means for locating a column number, a page number, and a line-range number for the associated segment of textual description. And, the step d) of employing the display means for displaying the associated segment of textual descriptions with

5   the graphic elements further displaying the column number, the page number, and the line-range number for the segment of textual description for each of the graphic elements. In another preferred embodiment, the method further includes a step of e) employing a user interface for allowing a user to input a naming-term to invoke the search and link

10   means for searching and linking the naming-term to an associated segment of textual description and for displaying a report of finding the associated segment of textual description.

Therefore, the present invention provides a document management

15   system for linking and presenting each of the graphical elements to associated textual descriptions and related claimed elements such that the difficulties and inconveniences are resolved. Specifically, the present invention provides a novel document management and presentation system to search and link textual descriptions and elements in different

20   claims of a patent document associated with each of the alpha-numeral designations of the graphic elements. A link is first established between each of the alpha-numeral designations for each of the graphical elements to a naming-term of a first textual description associated with that alpha-numeral designation. Then all related descriptions for that particular

25   naming-term are linked and gathered in a list file for that graphic element. The list file can then be displayed along with the associated graphic element for convenience of document review. A novel graphic-based document review system is disclosed by providing user options to either review the drawings with textual descriptions or claim languages

30   of a patent document displayed in a text box next to a related graphic element. Or, a document reviewer may enter a naming-term to invoke a graphic presentation related to that naming-term and all the associated descriptions and/or claim languages for that naming-term in a text box next to the graphic element associated with that naming-term.

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L&C-9901

    Although the present invention has been described in terms of the
presently preferred embodiment, it is to be understood that such
disclosure is not to be interpreted as limiting. Various alternations and
modifications will no doubt become apparent to those skilled in the art

5   after reading the above disclosure. Accordingly, it is intended that the
appended claims be interpreted as covering all alternations and
modifications as fall within the true spirit and scope of the invention.